

企业级固态硬盘 解决方案规划蓝图

2024年 第二季度

AGENDA

- 公司簡介與更新
- 群聯企業級SSD產品策略
- 企业级固态硬盘解决方案规划蓝图与规格
- 企业级固态硬盘解决方案介紹



关于群联的六个数字



经验

23+

年



\$1.5B

2023年总营收

80%+

R&D 研发费用 / 营运费用



**3800
+HC**

75% R&D

20%+

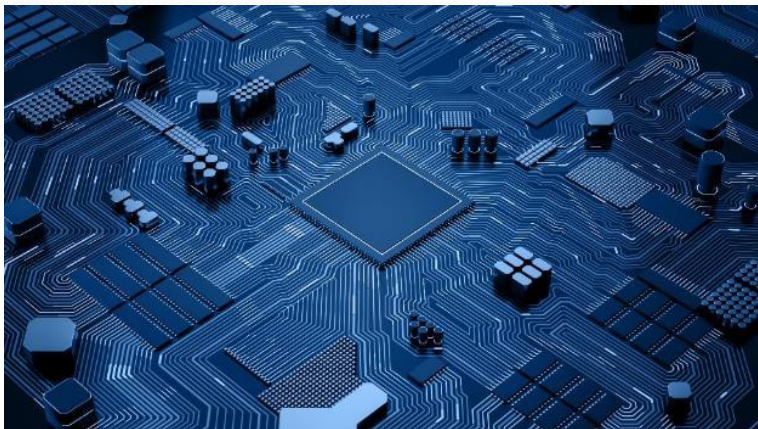
全球固态硬盘主控市占率

业务重点

消费型 | 嵌入式 | 企业级
车载应用 | 游戏应用 | 客制化服务
电源管理 IC | 信号调节 IC

独一无二的商业经营模式

加速创新的基石



客制化 IC

- NAND 半导体最佳合作伙伴
- 支持多种 NAND
- 精湛的 ASIC 知识
- 尖端的 ECC 设计



SSDs 解决方案

- 主控 / NAND / DRAM 一体化
- 垂直整合
- 系统级验证
- 一站式购物



设计服务

- 全方位 IP 授权
- TSMC / UMC 制程
- 高度客制化
- 软件开发工具包

群联固态硬盘技术 – 广受国际大厂信赖好评

奔向宇宙 · 开启无限可能

群联持续推动太空技术储存解决方案



群联 aiDAPIV+ 服务平台

群联以专有AI设计服务和NAND存储解决方案为您创造更多商机与价值

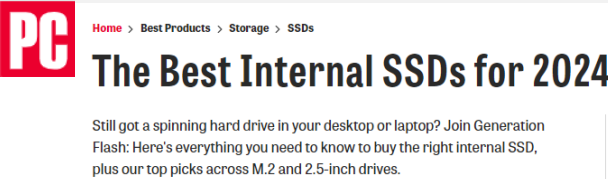


获奖

群联以其卓越技术与服务，荣获美光与铠侠肯定

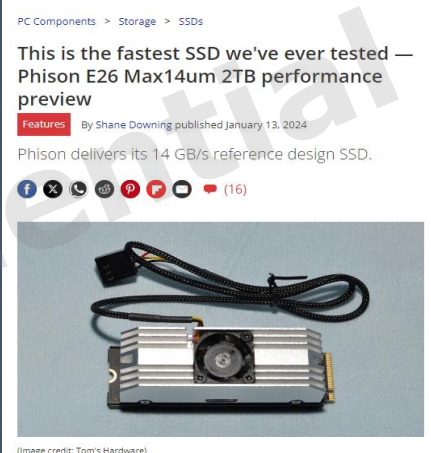


PCMag: 获得2024年最佳内部SSD奖项，11款获奖品项有3款为搭载群联主控



- Crucial T500 : E25
- Crucial T700 : E26
- Crucial P3 : E21T

新闻集锦



- Sources:
1. <https://www.phison.com/en/企业/newsroom>
 2. <https://www.pcmag.com/picks/the-best-internal-ssds>
 3. <https://www.tomshardware.com/pc-components/ssds/this-is-the-fastest-ssd-weve-ever-tested-phison-e26-max14um-2tb-performance-preview>
 4. <https://www.phison.com/en/企业/newsroom/press-releases/general/3634-phison-launches-full-range-of-ufs-storage-solutions-for-unparalleled-mobile-storage-performance>
 5. <https://www.tomshardware.com/pc-components/cpus/phisons-new-software-uses-ssds-and-dram-to-boost-effective-memory-for-ai-training-demos-a-single-workstation-running-a-massive-70-billion-parameter-model-at-gtc-2024>



企业级固态硬盘

群联企业级固态硬盘产品策略

企业级 SSD 产品策略

可客制化解决方案

IMAGIN+

IMAGIN+ 设计服务

特殊企业服务器应用

- 客制化主控
- 客制化产品
- 客制化功能与规格

高阶/旗舰解决方案



Dual-port U.2

一级储存装置 OEMs 大厂

- 同级最佳效能表现
- 客制化规格与特性
- 高可靠性与高质量

主流解决方案



M.2 | E1.S SSD

储存系统整合商

- 高能源效率
- 服务器启动碟
- 具竞争力的价格

典型解决方案



SATA DC SSD

典型 | HDD 装置汰换

- 业界领先的容量
- 长青型解决方案，可长期技术支持
- 高性价比

群联企业级 SSD 产品阵容



X 系列

- HPC
- 数据分析
- 线上交易
- 影像识别



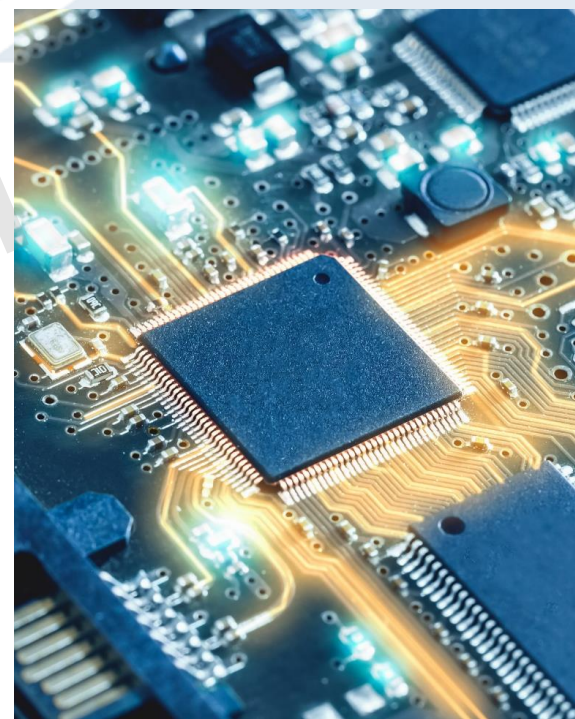
D 系列

- 工作站
- NAS
- 一般資料儲存



S 系列

- 资料库
- 社群平台
- 媒体串流



B 系列

- 服务器启动



企业级固态硬盘

解决方案规划蓝图与规格总览

企业级与数据中心固态硬盘主控产品规划蓝图

CS

MP

	2024				2025				2026
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
X 系列 高阶/旗舰解决方案 NVMe	X100 PCIe 4.0 / U.3 / 1 or 3 DWPD / 1.6TB to 30.72TB								
			X200 PCIe 5.0 / U.2, E3.S / 1 or 3 DWPD / 1.6TB to 30.72TB						
									X300
D 系列 Mainstream NVMe	D100 PCIe 4.0 / M.2 2280, M.2 22110, E1.S / 1 DWPD / 480GB to 3.84TB								
			D200 PCIe 5.0 / E1.S / 1 or 3 DWPD / 1.6TB to 7.68TB (6.4TB, 7.68TB CS in Q1'25)						
S 系列 SATA SSD									
	SA50 SATA III / 2.5" / 0.4 or 1 or 3 DWPD / 480GB to 15.36TB								
B 系列 服务器启动碟									
	B100 PCIe 4.0 / M.2 2280 / 1 DWPD / 480GB to 960GB								
	BA50 SATA III / M.2 2280, 2.5" / 1 DWPD / 240GB to 960GB								

群联企业级固态硬盘解决方案一览

产品形态	接口	DWPD	NAND 闪存	容量	系列名称
2.5" 	SATA III	1	3D TLC	480GB - 7,680GB	SA50P
		0.4	3D TLC	1,920GB - 15,360GB	SA50V
		3	3D TLC	480GB - 3,840GB	SA50E
		1	3D TLC	240GB - 960GB	BA50P
M.2 2280 	SATA III	1	3D TLC	240GB - 960GB	BA50P
	PCIe 4.0	1	3D TLC	480GB - 960GB	B100P
M.2 22110 		PCIe 4.0	1	3D TLC	480GB - 1,920GB
	1		3D TLC	480GB - 3,840GB	D100P
E1.S 	PCIe 4.0	1	3D TLC	480GB - 3,840GB	D100P
	PCIe 5.0	1	3D TLC	1,920GB - 3,840GB	D200P
	PCIe 5.0	3	3D TLC	1,600GB - 3,200GB	D200E
U.2/U.3 	PCIe 4.0	1	3D TLC	1,920GB - 30,720GB	X100P
		3	3D TLC	1,600GB - 25,600GB	X100E
U.2 	PCIe 5.0	1	3D TLC	1,920GB - 30,720GB	X200P
		3	3D TLC	1,600GB - 25,600GB	X200E
E3.S 	PCIe 5.0	1	3D TLC	1,920GB - 15,360GB	X200P
		3	3D TLC	1,600GB - 12,800GB	X200E



企业级固态硬盘

解决方案介绍

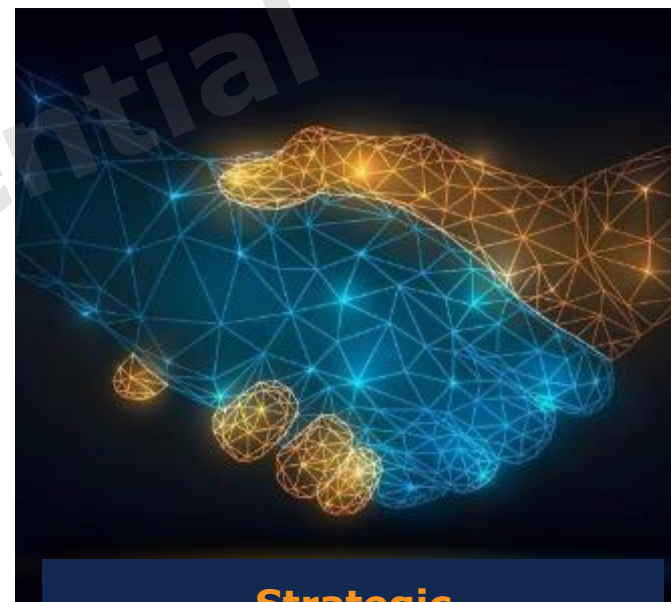
群联与 Seagate 宣布建立企业级 SSD 合作伙伴关系



- 业界第一，值得信赖的企业级SSD品牌
- 丰富的产品线
- 具备优越的验证程序
- 全球支援

PHISON

- 世界最大可订制 SSD 制造商
- 开发多种用于主控内的IP
- 主控与韧体并行开发



**Strategic
Partnership**

Best-in-Class Performance
and Features SSDs

X100系列 解決方案介紹



X100系列 SSD

群联 X100系列 SSD 解决方案可高度定制，为企业客户提供极佳效能与优越智能兼具的全球基础设施。

X100系列 具备一流的性能，使企业能够通过更高的存储密度、更低的功耗与更佳的性能来降低总体拥有成本。

规格

- **Interface** : PCIe 4.0 x4
- **Protocol** : NVMe 1.4
- **Capacity** : 2TB to 32TB
- **Form Factor** : U.3/U.2, 2.5" x 15mm
- **DWPD** : Up to 3 DWPD
- **MTBF** : 2.5 million hours
- **Warranty** : 5 years

功能特性

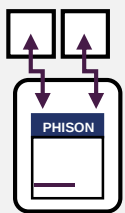
- Dual-port design
- Ultra-low latency
- Power loss protection (PLP)
- End-to-end data path protection (E2EDPP)
- Phison 5th Gen LDPC ECC engine
- Self-encrypting drive (SED) & FIPS 140-3¹
- Optimized for 24/7 enterprise workload

效能

Seq. Read	7,400 MB/s
Seq. Write	6,900 MB/s
Ran. Read	1,750K IOPS
Ran. Write	470K IOPS

1. Based on customer's requirement.

存在于 PS5020-X1 内部的先进技术



双端口设计

- Allowing SSD to connect to 2 hosts simultaneously
- Failover connectivity



数据完整性

- Extremely high data integrity with end-to-end data path protection
- Hardware pFail to prevent data loss from power outages or interrupts



U.3 接口

- Tri-mode supported
- Backward compatible with U.2
- Simple and flexible



可靠度

- Zero defect under 70°C environment with 1,200 drives
- UBER < 1 in 10¹⁸ bits read (JEDEC standard: 10¹⁷)
- Advanced LDPC ECC engine



服务质量 (QoS)

- Performance consistency over 95%
- 1,384 μs for 99.999% 4K ran. read latency
- Running at highest speed without dropping

群联企业级SSD X100E (3.2TB, 3 DWPD)

PHISON

X100E



企业 S

PM1X35

企业 K

CMX-V

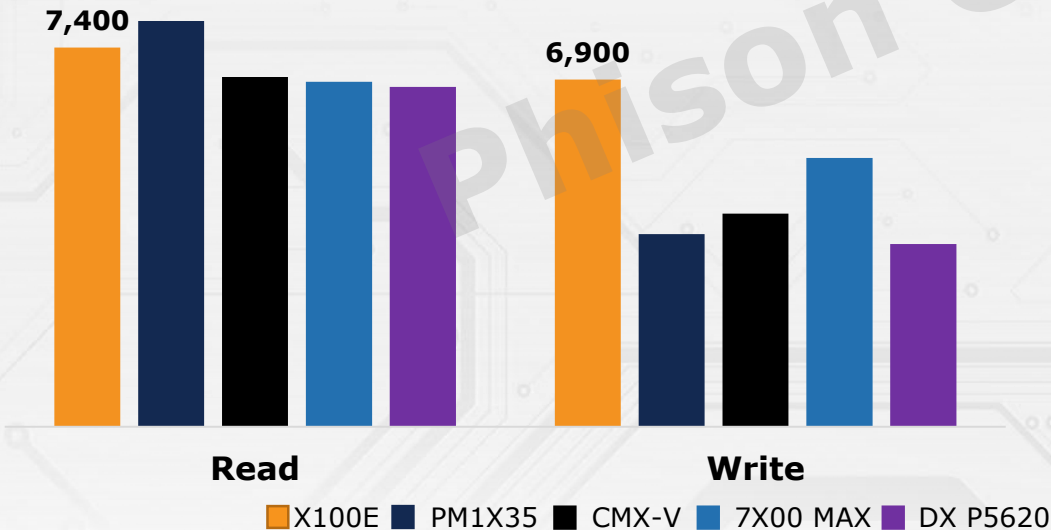
企业 M

7X00 MAX

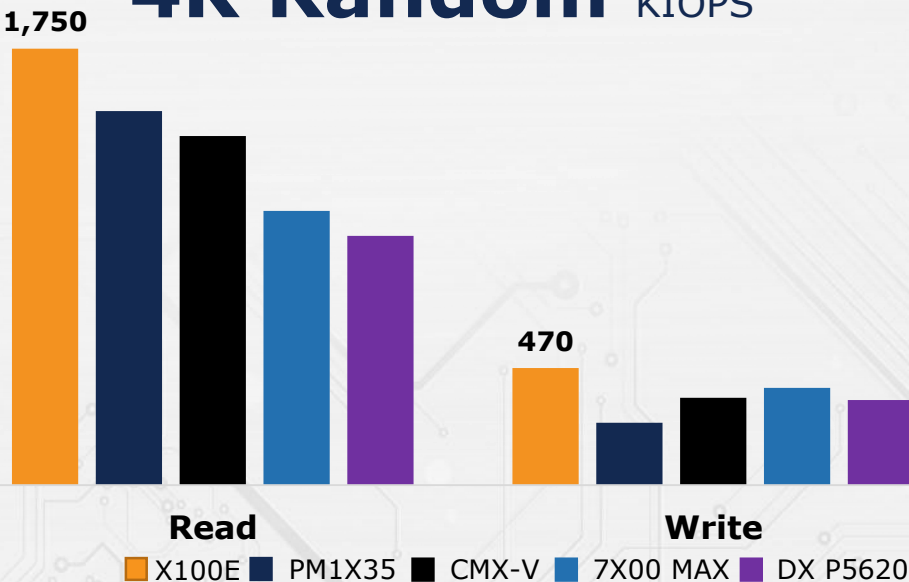
企业 S

DX P5620

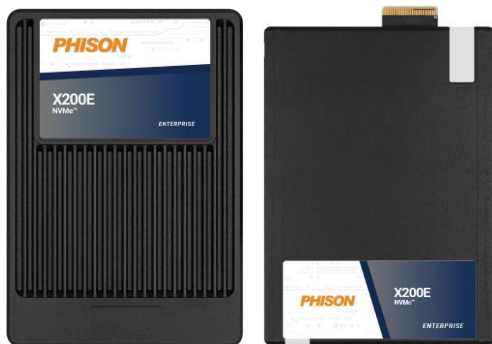
Sequential MB/s



4K Random KIOPS



X200系列 解决方案介绍



X200系列 SSD

专为企业级应用设计，具备 PCIe Gen5 卓越的效能及功能特性、同时拥有高耐用性与经济效益的解决方案。
群联致力于开发先进的 SSD 技术，为业界大容量储存装置供货商提供更高密度、
且卓越效能与能源效率兼具的最佳固态硬盘解决方案。

规格

- **Interface** : PCIe 5.0 x 4
- **Protocol** : NVMe 2.0
- **Capacity** : Up to 32TB
- **Form Factor** : U.2 / E3.S
- **DWPD** : 1 and 3 DWPD
- **MTBF** : 2.5 million hours
- **Warranty** : 5 years

功能特性

- Dual-port design
- Ultra-low latency
- Power loss Protection
- MF-QoS
- Name Space: 128

效能

Seq. Read	14,800 MB/s
Seq. Write	8,700 MB/s
Ran. Read	3,000K IOPS
Ran. Write	900K IOPS

业界最先进 PCIe 5.0 企业级 SSD

PHISON

X200



VS

企业 K

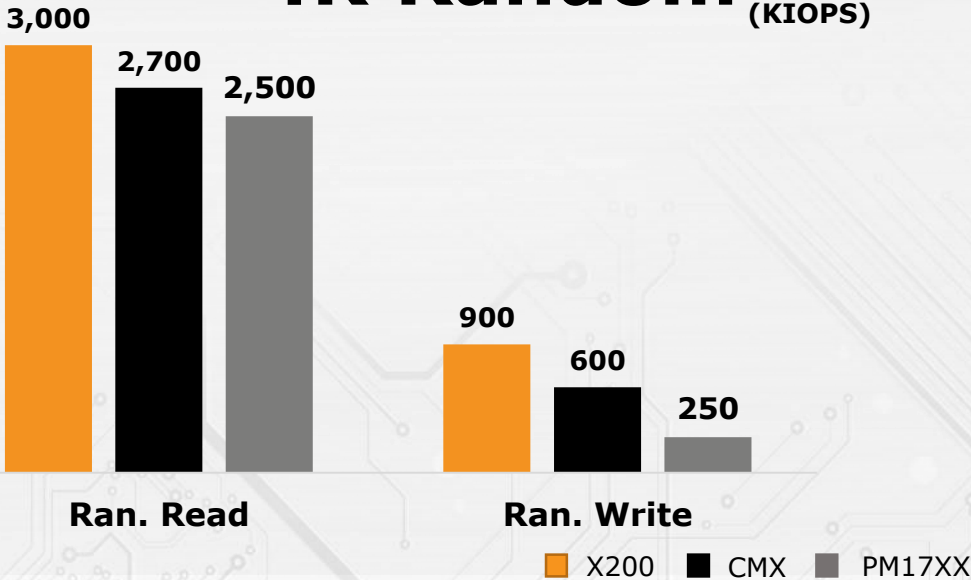
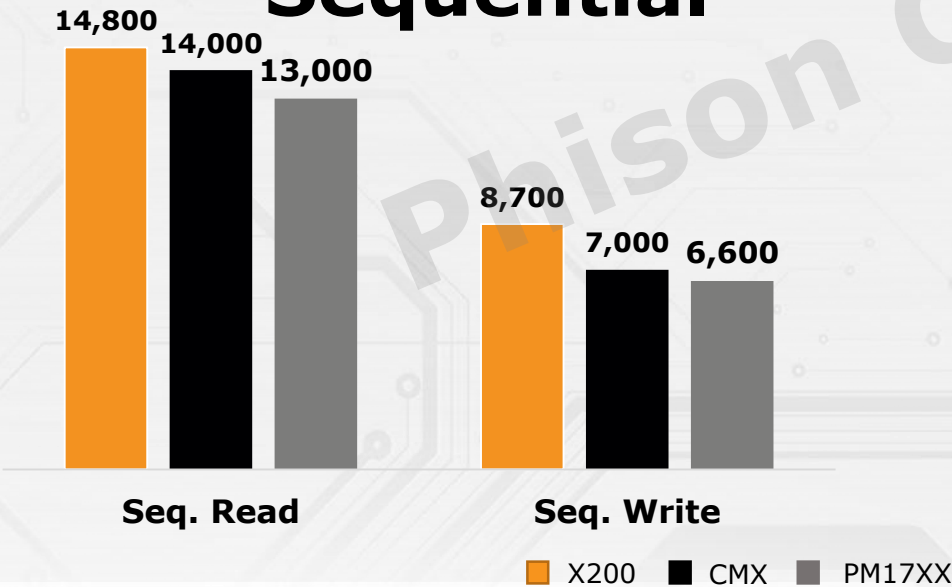
CMX

企业 S

PM17XX

Sequential

4K Random (KIOPS)





PHISON

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CONFIDENTIAL

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Appendix

PCIe Enterprise SSD Product Configurations (X100 Series)

PCIe Gen4 x 4 **Dual Port/Single Port**

✓ Supported

Form Factor	Product Series	H/W Pfail	Capacity	Up to DWPD (5 Years)	Product Status	S. Seq. R/W (MB/s)	S. 4K Random R/W (IOPS)
U.3 2.5" 	X100P X1 TLC	✓ (Aluminum cap)	1,920GB	1	Ready	7400/4200	1750K/126K
		✓ (Aluminum cap)	3,840GB	1	Ready	7400/6900	1750K/188K
		✓ (Aluminum cap)	7,680GB	1	Ready	7400/6900	1750K/190K
		✓ (Tantalum)	15,360GB	1	Ready	7000/7000	1600K/180K
		✓ (Tantalum)	30,720GB	1	Ready	7000/6000	1600K/180K
U.3 2.5" 	X100E X1 TLC	✓ (Aluminum cap)	1,600GB	3	Ready	7400/4200	1750K/300K
		✓ (Aluminum cap)	3,200GB	3	Ready	7400/6900	1750K/460K
		✓ (Aluminum cap)	6,400GB	3	Ready	7400/6900	1750K/470K
		✓ (Tantalum)	12,800GB	3	Ready	7000/7000	1600K/480K
		✓ (Tantalum)	25,600GB	3	Ready	7000/6000	1600K/450K

PCIe Enterprise SSD Product Configurations (X200 Series: U.2)

PCIe Gen5 x 4 **Dual Port/Single Port**

✓ Supported

Form Factor	Product Series	H/W Pfail	Capacity	Up to DWPD (5 Years)	Product Status	S. Seq. R/W (MB/s)	S. 4K Random R/W (IOPS)
U.2 2.5" 	X200P X2 TLC	✓ (Aluminum cap)	1,920GB	1	CS	14800 / 4300	2400K / 170K
		✓ (Aluminum cap)	3,840GB	1	CS	14800 / 8600	3350K / 380K
		✓ (Aluminum cap)	7,680GB	1	CS	14800 / 8700	3300K / 440K
		✓ (Tantalum)	15,360GB	1	CS: Jul'24	14800 / 8350	3200K / 500K
		✓ (Tantalum)	30,720GB	1	CS: Jul'24	14800 / 8250	3000K* / 450K*
U.2 2.5" 	X200E X2 TLC	✓ (Aluminum cap)	1,600GB	3	CS	14800 / 4300	2400K / 400K
		✓ (Aluminum cap)	3,200GB	3	CS	14800 / 8600	3000K / 800K
		✓ (Aluminum cap)	6,400GB	3	CS	14800 / 8700	3000K / 900K
		✓ (Tantalum)	12,800GB	3	CS: Jul'24	14800 / 8350	3000K / 900K
		✓ (Tantalum)	25,600GB	3	CS: Jul'24	14800* / 8250*	3000K* / 800K*

PCIe Enterprise SSD Product Configurations (X200 Series: E3.S)

PCIe Gen5 x 4 **Dual Port/Single Port**

✓ Supported

Form Factor	Product Series	H/W Pfail	Capacity	Up to DWPD (5 Years)	Product Status	S. Seq. R/W (MB/s)	S. 4K Random R/W (IOPS)
E3.S 	X200P X2 TLC	✓ (Tantalum)	1,920GB	1	CS: May'24	14800 / 4300	2400K/170K
		✓ (Tantalum)	3,840GB	1	CS: May'24	14800 / 8600	3000K/380K
		✓ (Tantalum)	7,680GB	1	CS: May'24	14800 / 8700	3000K/500K
		✓ (Tantalum)	15,360GB	1	CS: Jul'24	14800 / 8350	3000K/500K
E3.S 	X200E X2 TLC	✓ (Tantalum)	1,600GB	3	CS: May'24	14800 / 4300	2400K/400K
		✓ (Tantalum)	3,200GB	3	CS: May'24	14800 / 8600	3000K/800K
		✓ (Tantalum)	6,400GB	3	CS: May'24	14800 / 8700	3000K/900K
		✓ (Tantalum)	12,800GB	3	CS: Jul'24	14800 / 8350	3300K/900K

PCIe Enterprise SSD Product Configurations (D200 Series: E1.S)

PCIe Gen5 x 4 **Single Port**

√ Supported
√ Performance Number Estimated

Form Factor	Product Series	H/W Pfail	Capacity	Up to DWPD (5 Years)	Product Status	S. Seq. R/W (MB/s)	S. 4K Random R/W (IOPS)
E1.S 	D200P	√ (Tantalum)	1,920GB	1	CS: Jul'24	14000 / 4300	2400K / 170K
	X2						
	TLC	√ (Tantalum)	3,840GB	1	CS: Jul'24	14000 / 8500	3200K / 220K
E1.S 	D200E	√ (Tantalum)	1,600GB	3	CS: Jul'24	14000 / 4300	2400K / 400K
	X2						
	TLC	√ (Tantalum)	3,200GB	3	CS: Jul'24	14000/ 8500	3200K / 500K

PCIe Enterprise SSD Product Configurations (B100/D100 Series)

PCIe Gen4 x 4

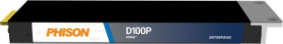
✓ Supported

Form Factor	Product Series	H/W Pfail	Capacity	Up to DWPD (5 Years)	Product Status	S. Seq. R/W (MB/s)	S. 4K Random R/W (IOPS)
M.2 2280 	B100P TLC	✓ (Tantalum)	480GB	1.0	MP	4000/300	250K/15K
		✓ (Tantalum)	960GB	1.0	MP	5000/700	450K/30K
M.2 2280 	D100P TLC	✓ (Tantalum)	480GB	1.0	MP	6000/700	450K/25K
		✓ (Tantalum)	960GB	1.0	MP	6000/1400	750K/50K
		✓ (Tantalum)	1920GB	1.0	MP	6000/1800	800K/60K
M.2 22110 	D100P TLC	✓ (Tantalum)	480GB	1.0	MP	6500/700	450K/25K
		✓ (Tantalum)	960GB	1.0	MP	6800/1400	800K/50K
		✓ (Tantalum)	1920GB	1.0	MP	6800/2000	900K/60K
		✓ (Tantalum)	3840GB	1.0	MP	6800/1700	650K/70K

PCIe Enterprise SSD Product Configurations (B100/D100 Series)

PCIe Gen4 x 4

✓ Supported

Form Factor	Product Series	H/W Pfail	Capacity	Up to DWPD (5 Years)	Product Status	S. Seq. R/W (MB/s)	S. 4K Random R/W (IOPS)
EDSFF E1.S 	D100P TLC	✓ (Tantalum)	480GB	1	CS ready	6500/700	450K/25K
		✓ (Tantalum)	960GB	1	CS ready	6800/1400	800K/50K
		✓ (Tantalum)	1920GB	1	CS ready	6800/2000	900K/60K
		✓ (Tantalum)	3840GB	1	CS ready	6800/1700	650K/70K

SATA Enterprise SSD Product Configurations (SA50 Series)

√ Supported

Form Factor	Product Series	H/W Pfail	Capacity	Up to DWPD (5 Years)	Product Status	S. Seq. R/W (MB/s)	S. 4K Random R/W (IOPS)
2.5" 	<u>SA50V</u> TLC	√ (Aluminum cap)	1920GB	>0.4	Ready	530/500	94K/13K
			3840GB			530/500	97K/20K
		√ (Tantalum)	7680GB			530/500	97K/14K
			15360GB			530/500	94K/10K
	<u>SA50E</u> TLC		480GB	3	CS: Apr'24	500/440	98K/32K
		√ (Aluminum cap)	960GB			530/500	98K/55K
			1920GB			530/500	98K/55K
			3840GB			530/500	98K/46K

SATA Enterprise SSD Product Configurations (SA50 Series)

✓ Supported

Form Factor	Product Series	H/W Pfail	Capacity	Up to DWPD (5 Years)	Product Status	S. Seq. R/W (MB/s)	S. 4K Random R/W (IOPS)
2.5" 	SA50P Series TLC	✓ (Aluminum cap)	480GB	1.0	MP	530/360	92K/20K
			960GB			530/500	98K/33K
			1920GB			530/500	98K/40K
		✓ (Aluminum cap)	3840GB	1.0	MP	530/500	98K/30K
		✓ (Aluminum cap)	7680GB	1.0	MP	530/500	97K/23K

SATA Enterprise SSD Product Configurations (BA50 Series)

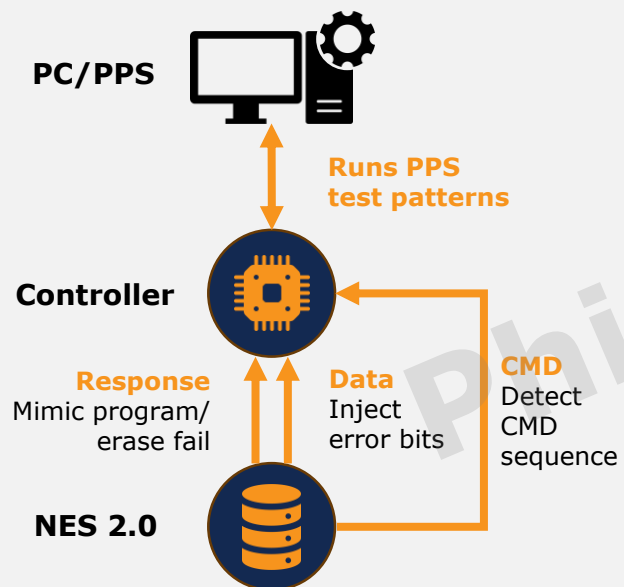
✓ Supported

Form Factor	Product Series	H/W Pfail	Capacity	Up to DWPD (5 Years)	Product Status	S. Seq. R/W (MB/s)	S. 4K Random R/W (IOPS)
2.5" 	BA50P TLC	✓ (Aluminum cap)	240GB	1	CS Ready	530/290	60K/10K
			480GB			530/480	90K/15K
			960GB			530/500	98K/30K
M.2 2280 	BA50P TLC	✓ (Tantalum)	240GB	1	MP	530/290	60K/10K
			480GB			530/480	90K/15K
			960GB			530/500	98K/30K

PHISON SSD Design Validation

NAND Emulator System

Ensures NAND operations and Shortens Time to Market



Phison Pattern System (PPS)

Robust Validation System

- Garbage Collection
- Customer Request
- JEDEC Spec
- Flash Translation Layer
- Feedback Bugs
- Platform Behavior
- Stress Test
- Data Reliability
- Power Cycling Test

Strong Facility Investment

Ensure compatibility/compliance before shipping

- 4,000+ Testing Platforms
- Self-built Chamber for strict environmental tests
- High-speed Signal Lab for signal integrity check including PCIe/MPHY/USB/DDR/ONFi
- Increasing CAPEX of cutting edge equipment to enable first to market technologies



Test for Enterprise Quality

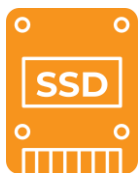
- <200 factory DPPM
- <0.5% AFR
- Better UBER than JEDEC requirements
- Consistent workload performance through EOL
- Enterprise factory quality with ORT

PHISON Enterprise SSD Aligned with Industry Best Practices

Total Investment on Reliability Test > \$ 50M per model, per generation



6000+
Testing Hours



2000+
Samples



20+
Chambers

- ✓ UBER: 10^{-18}
- ✓ Max Shock: 1300G/0.5ms
- ✓ Non-OP Altitude: 40,000 feet
- ✓ Non-OP Temp.: -40~85C

MTBF
2.5M
hours